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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,703	01/16/2002	Sang-Bom Kang	9898-207	1366

20575 7590 04/27/2006

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EXAMINER	
ZERVIGON, RUDY	
ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 04/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/052,703	KANG ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-5 are rejected under 35 U.S.C. 102(e) as being anticipated by Kinnard; David W. et al. (US 6,635,117 B1). Kinnard teaches a shower head (54/154; Figure 1,3,5; column 5, lines 35-65) for supplying a reaction gas to a wafer (18; Figure 1; column 3, lines 37-46) in a process chamber (16/116; Figure 1,3; column 5, lines 35-65), the shower head (54/154; Figure 1,3,5; column 5, lines 35-65) comprising: a plurality of plates (155, 154; Figure 3; column 5, lines 35-50) comprising gas paths for supplying a reaction gas to a wafer (18; Figure 1; column 3, lines 37-46); and a cooling system (180; Figure 3; column 5, lines 35-50) comprising a plurality of coolant inlets (182; Figure 3; column 6, lines 22-29) and a plurality of coolant outlets (186; Figure 3; column 6, lines 22-29) formed in a lower one (154; Figure 3; column 5, lines 35-50) of the plurality of plates (155, 154; Figure 3; column 5, lines 35-50), and further comprising a plurality of inner cooling lines (180; Figure 5; column 6, lines 45-54) configured to connect each of the plurality of coolant inlets (182; Figure 3; column 6, lines 22-29) to one of the plurality of coolant outlets (186; Figure 3; column 6, lines 22-29), as claimed by claimed 1

Kinnard further teaches:

i. A shower head (54/154; Figure 1,3,5; column 5, lines 35-65) according to claim 1, wherein the plurality of coolant inlets (182; Figure 3; column 6, lines 22-29) and the plurality of coolant outlets (186; Figure 3; column 6, lines 22-29) are formed on a side of the lower plate (154; Figure 3; column 5, lines 35-50), as claimed by claim 2

ii. A shower head (54/154; Figure 1,3,5; column 5, lines 35-65) according to claim 1, wherein at least four coolant inlets (182; Figure 3; column 6, lines 22-29), at least four coolant outlets (186; Figure 3; column 6, lines 22-29), and at least four inner cooling lines (180; Figure 5; column 6, lines 45-54) are formed, as claimed by claim 3

iii. A shower head (54/154; Figure 1,3,5; column 5, lines 35-65) according to claim 1, wherein the plurality of coolant inlets (182; Figure 3; column 6, lines 22-29) are formed on a first side (right side; Figure 3) of the lower plate (154; Figure 3; column 5, lines 35-50), the plurality of coolant outlets (186; Figure 3; column 6, lines 22-29) are formed on a second side (left side; Figure 3) of the lower plate (154; Figure 3; column 5, lines 35-50), and the plurality of inner cooling lines (180; Figure 5; column 6, lines 45-54) are formed parallel to each other, as claimed by claim 4

iv. A shower head (54/154; Figure 1,3,5; column 5, lines 35-65) according to claim 1, wherein a first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) is connected to a first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29) by a first inner cooling line (bottom 180; Figure 5; column 6, lines 22-29), wherein a second coolant outlet (middle 186; Figure 3; column 6, lines 22-29) is connected to a second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) by a second inner cooling line (middle 180; Figure 5; column 6, lines 22-29), and wherein the second coolant outlet (middle 186;

Figure 3; column 6, lines 22-29) is located adjacent to the first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) on a first side (right side; Figure 3) of the lower plate (154; Figure 3; column 5, lines 35-50), as claimed by claim 5

Claim Rejections - 35 USC § 102/103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 6, 7 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kinnard; David W. et al. (US 6,635,117 B1). Kinnard is discussed above. Kinnard appears to teach a shower head (54/154; Figure 1,3,5; column 5, lines 35-65) according to claim 1, wherein a first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29) is connected to a first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) by a first inner cooling line (bottom 180; Figure 5; column 6, lines 22-29), and wherein the first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29) is positioned approximately 90° from a position of the first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) along an circumferential edge of the lower plate (154; Figure 3; column 5, lines 35-50), as claimed by claim 6.

Kinnard may also further teach a shower head (54/154; Figure 1,3,5; column 5, lines 35-65) according to claim 6, wherein a second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) is located adjacent to the first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29), wherein the second coolant outlet (middle 186; Figure 3; column 6, lines 22-29) is connected to a

second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) by a second inner cooling line (middle 180; Figure 5; column 6, lines 22-29), and wherein the second coolant outlet (middle 186; Figure 3; column 6, lines 22-29) is located approximately 90 ° from a position of the second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) along the edge of the lower plate (154; Figure 3; column 5, lines 35-50), and wherein the second coolant outlet (middle 186; Figure 3; column 6, lines 22-29) is located approximately ° from the first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) along the edge of the lower plate (154; Figure 3; column 5, lines 35-50), as claimed by claim 7.

Because Kinnard's Figure 5 is not to scale, it is not certain if Kinnard's first/second coolant outlet (bottom 186; Figure 3; column 6, lines 22-29) is positioned approximately 90° from a position of Kinnard's first/second coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) along an circumferential edge of Kinnard's lower plate (154; Figure 3; column 5, lines 35-50).

In the event that Kinnard's angle is not deemed to be "approximately 90° " then, it would have been obvious to ne of ordinary skill in the art at the time the invention was made to optimize the dimension of Kinnard's apparatus.

Motivation to optimize the dimension of Kinnard's apparatus is for achieveing localised cooling as taught by Kinnard (column 3; lines 1-11).

Claim Rejections - 35 USC § 103

5. Claims 9-13, 16-18, 20-26, 28-31, and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinnard; David W. et al. (US 6,635,117 B1) in view of Heimanson; Dorian et al. (US 5,775,416 A). Kinnard is discussed above. Kinnard further teaches an apparatus for forming a thin film, said apparatus comprising: a process chamber (16/116; Figure 1,3; column

5, lines 35-65); a heater stage (20; Figure 1; column 3, lines 35-46) located in a lower portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65), said heater stage (20; Figure 1; column 3, lines 35-46) configured to support a wafer (18; Figure 1; column 3, lines 37-46) and to heat the wafer (18; Figure 1; column 3, lines 37-46) to a high temperature; a shower head (54/154; Figure 1,3,5; column 5, lines 35-65) located in an upper portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65), said shower head (54/154; Figure 1,3,5; column 5, lines 35-65) configured to supply a reaction gas to the wafer (18; Figure 1; column 3, lines 37-46) - claim 9

Kinnard further teaches:

i. An apparatus for forming a thin film, said apparatus comprising: a process chamber (16/116; Figure 1,3; column 5, lines 35-65); a heater stage (20; Figure 1; column 3, lines 35-46) arranged in a lower portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) and configured to support a wafer (18; Figure 1; column 3, lines 37-46) and to heat the wafer (18; Figure 1; column 3, lines 37-46) to a high temperature; a shower head (54/154; Figure 1,3,5; column 5, lines 35-65) disposed in an upper portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) and configured to supply a reaction gas to the wafer (18; Figure 1; column 3, lines 37-46), said shower head (54/154; Figure 1,3,5; column 5, lines 35-65) comprising a plurality of plates (155, 154; Figure 3; column 5, lines 35-50) having a plurality of gas paths formed therein and a shower head (54/154; Figure 1,3,5; column 5, lines 35-65) cooling system (180; Figure 3; column 5, lines 35-50) arranged in a lower plate (154; Figure 3; column 5, lines 35-50); said cooling system (180; Figure 3; column 5, lines 35-50) comprising a plurality of coolant inlets

(182; Figure 3; column 6, lines 22-29), a plurality of coolant outlets (186; Figure 3; column 6, lines 22-29), and a plurality of independent inner cooling lines (180; Figure 5; column 6, lines 45-54) for connecting each of the coolant inlets (182; Figure 3; column 6, lines 22-29) to one of the coolant outlets (186; Figure 3; column 6, lines 22-29) – claim 20

ii. An apparatus according to claim 20, wherein the plurality of coolant inlets (182; Figure 3; column 6, lines 22-29) and the plurality of coolant outlets (186; Figure 3; column 6, lines 22-29) are formed along an edge of the lower plate (154; Figure 3; column 5, lines 35-50), as claimed by claim 21

iii. An apparatus according to claim 20, wherein at least four coolant inlets (182; Figure 3; column 6, lines 22-29), at least four coolant outlets (186; Figure 3; column 6, lines 22-29), and at least four inner cooling lines (180; Figure 5; column 6, lines 45-54) are formed, as claimed by claim 22

iv. An apparatus according to claim 20, wherein the plurality of coolant inlets (182; Figure 3; column 6, lines 22-29) are formed on one side (right side; Figure 5) of the lower plate (154; Figure 3; column 5, lines 35-50), the plurality of coolant outlets (186; Figure 3; column 6, lines 22-29) are formed on an opposite side (left side; Figure 5) of the lower plate (154; Figure 3; column 5, lines 35-50), and the plurality of inner cooling lines (180; Figure 5; column 6, lines 45-54) are formed parallel to each other, as claimed by claim 23

v. An apparatus according to claim 20, wherein a first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29) is connected to a first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) by a first inner cooling line (bottom 180; Figure 5; column 6, lines 22-29),

wherein a second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) is connected to a second coolant outlet (middle 186; Figure 3; column 6, lines 22-29) by a second inner cooling line (middle 180; Figure 5; column 6, lines 22-29), wherein the second coolant outlet (middle 186; Figure 3; column 6, lines 22-29) is arranged adjacent to the first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) on a first side (right side; Figure 3) of the lower plate (154; Figure 3; column 5, lines 35-50), wherein the first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29) is located adjacent to the second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) on a second side (left side; Figure 3) of the lower plate (154; Figure 3; column 5, lines 35-50), and wherein the second side (left side; Figure 3) of the lower plate (154; Figure 3; column 5, lines 35-50) is opposite the first side (right side; Figure 3), as claimed by claim 24

Kinnard does not teach:

i. a separating device arranged between a bottom of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) and a bottom of the heater stage (20; Figure 1; column 3, lines 35-46), said separating device configured to separate the heater stage (20; Figure 1; column 3, lines 35-46) from the bottom of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) and to reduce a volume of processing space within the process chamber (16/116; Figure 1,3; column 5, lines 35-65) – claim 9

ii. An apparatus according to claim 9, wherein the high temperature is about 500°C, as claimed by claim 10. However, Applicant's claim requirement is a claim requirement of intended use. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim

(Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

iii. An apparatus according to claim 9, wherein the separating device is located in a lower portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) and contacts the bottom of the heater stage (20; Figure 1; column 3, lines 35-46), as claimed by claim 11

iv. An apparatus according to claim 9, wherein the separating device is configured to separate the heater stage (20; Figure 1; column 3, lines 35-46) and the process chamber (16/116; Figure 1,3; column 5, lines 35-65) by a uniform distance, as claimed by claim 12

v. An apparatus according to claim 12, wherein the heater stage (20; Figure 1; column 3, lines 35-46) and the process chamber (16/116; Figure 1,3; column 5, lines 35-65) are separated by about 2-10cm, as claimed by claim 13

vi. An apparatus according to claim 9, wherein the separating device is rim-shaped and is configured to closely adhere to the bottom of the heater stage (20; Figure 1; column 3, lines 35-46), as claimed by claim 16

vii. An apparatus according to claim 9, further comprising: a shaft installed beneath the heater stage (20; Figure 1; column 3, lines 35-46) and configured to raise and lower the heater stage (20; Figure 1; column 3, lines 35-46); and a shaft introduction portion

configured to introduce the shaft at the bottom of the process chamber (16/116; Figure 1,3; column 5, lines 35-65), as claimed by claim 17

viii. An apparatus according to claim 17, wherein shaft introduction portion is formed as a flexible bellows and has a length that varies as the shaft is raised and lowered, as claimed by claim 18

ix. a separating device arranged between the process chamber (16/116; Figure 1,3; column 5, lines 35-65) and the heater stage (20; Figure 1; column 3, lines 35-46) to separate a space beneath the heater stage (20; Figure 1; column 3, lines 35-46) from a process chamber (16/116; Figure 1,3; column 5, lines 35-65) space containing the wafer (18; Figure 1; column 3, lines 37-46) to reduce a process volume of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) – claim 20

x. An apparatus according to claim 20, wherein a first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29) is connected to a first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) by a first inner cooling line (bottom 180; Figure 5; column 6, lines 22-29), wherein the first inner cooling line (bottom 180; Figure 5; column 6, lines 22-29) has a path that forms an approximately 90° angle, said angle having a vertex located at approximately the center of the lower plate (154; Figure 3; column 5, lines 35-50), as claimed by claim 25

xi. An apparatus according to claim 25, wherein a second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) is located adjacent to the first coolant outlet (bottom 186; Figure 3; column 6, lines 22-29), and wherein a second coolant outlet (middle 186; Figure 3; column 6, lines 22-29) is connected to the second coolant inlet (middle 182;

Figure 3; column 6, lines 22-29) by a second inner cooling line (middle 180; Figure 5; column 6, lines 22-29), and wherein the second outlet is located approximately 90 ° from the second coolant inlet (middle 182; Figure 3; column 6, lines 22-29) along a circumferential edge of the lower plate (154; Figure 3; column 5, lines 35-50), and wherein the second outlet is located approximately 180 ° from the first coolant inlet (bottom 182; Figure 3; column 6, lines 22-29) along the circumferential edge of the lower plate (154; Figure 3; column 5, lines 35-50), as claimed by claim 26

xii. An apparatus according to claim 20, wherein the high temperature is about 500°C, as claimed by claim 28. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

xiii. An apparatus according to claim 20, wherein the separating device is arranged in proximity to a bottom of the heater stage (20; Figure 1; column 3, lines 35-46) in a lower portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65), as claimed by claim 29

xiv. An apparatus according to claim 20, wherein the heater stage (20; Figure 1; column 3, lines 35-46) and the process chamber (16/116; Figure 1,3; column 5, lines 35-65) are

separated by a substantially uniform distance using the separating device, as claimed by claim 30

xv. An apparatus according to claim 30, wherein the heater stage (20; Figure 1; column 3, lines 35-46) and the process chamber (16/116; Figure 1,3; column 5, lines 35-65) are separated by about 2-10 cm, as claimed by claim 31

xvi. An apparatus according to claim 20, wherein the separating device is rim shaped and is configured to closely adhere to a bottom of the heater stage (20; Figure 1; column 3, lines 35-46), as claimed by claim 34

xvii. An apparatus according to claim 20, further comprising: a shaft configured to raise and lower the heater stage (20; Figure 1; column 3, lines 35-46), said shaft arranged beneath the heater stage (20; Figure 1; column 3, lines 35-46); and a shaft introduction portion configured to contain the shaft at the bottom of the process chamber (16/116; Figure 1,3; column 5, lines 35-65), as claimed by claim 35

xviii. An apparatus according to claim 35, wherein the shaft introduction portion comprises a flexible bellows wall having a variable length depending on the raising and lowering of the shaft, as claimed by claim 36

Heimanson teaches a plasma processing apparatus (Figure 1; column 2, line 64 – column 3, line 5) with integrated substrate control (column 1, line 65 – column 2, line 13). Heimanson further teaches:

xix. a separating device (36a; Figure 1; column 3, lines 50-60) arranged between a bottom of the process chamber (12; Figure 1; column 2, lines 64-68) and a bottom of the heater stage (26; Figure 1; column 3, lines 21-31), said separating device (36a; Figure 1; column

3, lines 50-60) configured to separate the heater stage (26; Figure 1; column 3, lines 21-31) from the bottom of the process chamber (12; Figure 1; column 2, lines 64-68) and to reduce a volume of processing space within the process chamber (12; Figure 1; column 2, lines 64-68) – claim 9, 20

xx. An apparatus according to claim 9, wherein the separating device (36a; Figure 1; column 3, lines 50-60) is located in a lower portion of the process chamber (12; Figure 1; column 2, lines 64-68) and contacts the bottom of the heater stage (26; Figure 1; column 3, lines 21-31), as claimed by claim 11

xxi. An apparatus according to claim 9, wherein the separating device (36a; Figure 1; column 3, lines 50-60) is configured to separate the heater stage (26; Figure 1; column 3, lines 21-31) and the process chamber (12; Figure 1; column 2, lines 64-68) by a uniform distance, as claimed by claim 12

xxii. An apparatus according to claim 9, wherein the separating device (36a; Figure 1; column 3, lines 50-60) is rim-shaped and is configured to closely adhere to the bottom of the heater stage (26; Figure 1; column 3, lines 21-31), as claimed by claim 16

xxiii. An apparatus according to claim 9, further comprising: a shaft (not numbered - above 108; Figure 1) installed beneath the heater stage (26; Figure 1; column 3, lines 21-31) and configured to raise and lower the heater stage (26; Figure 1; column 3, lines 21-31); and a shaft introduction portion (110; Figure 1; column 4, lines 45-51) configured to introduce the shaft (not numbered - above 108; Figure 1) at the bottom of the process chamber (12; Figure 1; column 2, lines 64-68), as claimed by claim 17

xxiv. An apparatus according to claim 17, wherein shaft introduction portion (110; Figure 1; column 4, lines 45-51) is formed as a flexible bellows and has a length that varies as the shaft (not numbered - above 108; Figure 1) is raised and lowered, as claimed by claim 18

xxv. An apparatus according to claim 20, wherein the separating device is arranged in proximity to a bottom of the heater stage (26; Figure 1; column 3, lines 21-31) in a lower portion of the process chamber (12; Figure 1; column 2, lines 64-68), as claimed by claim 29

xxvi. An apparatus according to claim 20, wherein the heater stage (26; Figure 1; column 3, lines 21-31) and the process chamber (12; Figure 1; column 2, lines 64-68) are separated by a substantially uniform distance using the separating device, as claimed by claim 30

xxvii. An apparatus according to claim 20, wherein the separating device (36a; Figure 1; column 3, lines 50-60) is rim shaped and is configured to closely adhere to a bottom of the heater stage (26; Figure 1; column 3, lines 21-31), as claimed by claim 34

xxviii. An apparatus according to claim 20, further comprising: a shaft (not numbered - above 108; Figure 1) configured to raise and lower the heater stage (26; Figure 1; column 3, lines 21-31), said shaft (not numbered - above 108; Figure 1) arranged beneath the heater stage (26; Figure 1; column 3, lines 21-31); and a shaft introduction portion (110; Figure 1; column 4, lines 45-51) configured to contain the shaft (not numbered - above 108; Figure 1) at the bottom of the process chamber (12; Figure 1; column 2, lines 64-68), as claimed by claim 35

xxix. An apparatus according to claim 35, wherein the shaft introduction portion (110; Figure 1; column 4, lines 45-51) comprises a flexible bellows wall having a variable length

depending on the raising and lowering of the shaft (not numbered - above 108; Figure 1), as claimed by claim 36

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Kinnard's substrate support apparatus with Heimanson's substrate support apparatus with optimized dimension.

Motivation to replace Kinnard's substrate support apparatus with Heimanson's substrate support apparatus with optimized dimension is for influencing substarte temperature control by heating and cooling as taught by Heimanson (column 2; lines 22-35).

6. Claims 8, 14, 15, 19, 27, 32, 33, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinnard; David W. et al. (US 6,635,117 B1) and Heimanson; Dorian et al. (US 5,775,416 A) in view of Katayama; Katsuo et al. (US 5,529,632 A). Kinnard and Heimanson are discussed above. Kinnard and Heimanson do not teach:

i. A shower head (54/154; Figure 1,3,5; column 5, lines 35-65) according to claim 1, further comprising: a first outer cooling line arranged outside the lower plate (154; Figure 3; column 5, lines 35-50) to connect the plurality of coolant inlets (182; Figure 3; column 6, lines 22-29); and a second outer cooling line arranged outside the lower plate (154; Figure 3; column 5, lines 35-50) to connect the plurality of coolant outlets (186; Figure 3; column 6, lines 22-29), as claimed by claim 8

ii. An apparatus according to claim 9, wherein the separating device (36a; Figure 1; column 3, lines 50-60) is formed of a heat-resistant material, as claimed by claim 14

iii. An apparatus according to claim 14, wherein the heat-resistant material is a ceramic material, as claimed by claim 15

iv. An apparatus according to claim 9, further comprising a process chamber (16/116; Figure 1,3; column 5, lines 35-65) cooling system (180; Figure 3; column 5, lines 35-50) configured to cool a bottom surface of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) whereon the separating device is located, as claimed by claim 19

v. An apparatus according to claim 20, further comprising: a first outer cooling line located outside the lower plate (154; Figure 3; column 5, lines 35-50) and configured to connect the plurality of coolant inlets (182; Figure 3; column 6, lines 22-29); and a second outer cooling line located outside the lower plate (154; Figure 3; column 5, lines 35-50) and configured to connect the plurality of coolant outlets (186; Figure 3; column 6, lines 22-29), as claimed by claim 27

vi. An apparatus according to claim 20, wherein the separating device is formed of a heat-resistant material, as claimed by claim 32

vii. An apparatus according to claim 32, wherein the heat-resistant material is a ceramic material, as claimed by claim 33

viii. An apparatus according to claim 20, further comprising a process chamber (16/116; Figure 1,3; column 5, lines 35-65) cooling system (180; Figure 3; column 5, lines 35-50) arranged in thermal communication with a lower portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65), said lower portion of the process chamber (16/116; Figure 1,3; column 5, lines 35-65) supporting the separating device, as claimed by claim 37

Katayama teaches a plasma processing apparatus (column 7; lines 19-38) including reactor skin temperature control (12; Figure 1; column 2, lines 21-43), the apparatus including:

i. a first outer cooling line (12a; Figure 1) arranged outside the outer plate (11a; Figure 1) and a second outer cooling line (return line, not labelled; Figure 1) arranged outside the outer plate (11a; Figure 1) - claim 8

ii. heat-resistant material (quartz; column 1; lines 27-39) - claim 14, 32

iii. wherein the heat-resistant material (quartz; column 1; lines 27-39) is a ceramic material (quartz; column 1; lines 27-39), as claimed by claim 15, 33

iv. An apparatus according to claim 9, further comprising a process chamber (11; Figure 1) cooling system (21b,c; 21; Figure 1) configured to cool a surface of the process chamber (11; Figure 1) - claim 19

v. An apparatus according to claim 20, further comprising: a first outer cooling line (12a; Figure 1) located outside the outer plate (11a; Figure 1); and a second outer cooling line (return line, not labelled; Figure 1) located outside the outer plate (11a; Figure 1) -claim 27

viii. An apparatus according to claim 20, further comprising a process chamber (11; Figure 1) cooling system (21b,c; 21; Figure 1) arranged in thermal communication with a lower portion of the process chamber (11; Figure 1) - claim 37

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Katayama's cooling system (21b,c; 21; Figure 1) to Kinnard and Heimanson's apparatus with optimized materials of construction.

Motivation to add Katayama's cooling system (21b,c; 21; Figure 1) to Kinnard and Heimanson's apparatus with optimized materials of construction is for controlling chamber wall adhesions during processing as taught by Katayama (column 3; lines 3-20), further, for using

"refractory..heat resistant" materials for processing parts as taught by Katayama (column 1; lines 30-40).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

Rudy Zervigon 4/24/6

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